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were issued between 1901 and 1907, one, in which tsetse flies were treated by E. E. Austen, in 1903, and now this volume by the same author covers the remainder of the Diptera.

With the exception of Egypt the territory covered in this work falls within the limits of the zoogeographic province ordinarily called the Ethiopian region. The record is confessedly incomplete, even for the region indicated, as the material available was at best scanty, so that data concerning detailed distribution which are given in the last chapter of the book are of relatively little value. This defect, which is commented upon briefly only in the preface, is of a serious character, since many of the medical and military men who will be called upon to use the book are likely to draw unwarranted, though none the less unfortunate, inferences from the brevity of the records, but even more serious difficulties arise from the omission of any reference to those species not illustrated here.

As natural in a work dealing with forms that have so recently attracted particular attention, museum material from different countries is sure to be variable in amount and the records compiled therefrom of very unequal value. Cape Colony naturally leads in number of species recorded and Uganda is a close second, but some states have only three or four species listed, *i. e.*, are represented by very little material in the museum collections and yet the text of this chapter conveys no hints as to the proper method of interpreting its lists.

Of the Chironomidæ the work describes and figures one genus including three species; of the Simuliidæ, one genus with four species; of the Psychodidæ, one genus with a single species; of the Tabanidæ, seven genera with eighty-four species; of the Muscidæ two genera with five species, and of the Hippoboscidæ one genus with three species. These represent less than one half of the African species already known. The illustrations are very successful and in practical work will be of immense value. Synoptic keys as well as specific and generic descriptions are entirely omitted and reliance placed rightly upon the

accuracy of the figures which are admirably done. The habitus and coloration of the species figured are vividly represented, even though few structural features are distinguishable in the plates.

The author handles the bionomics of the group treated in the broadest possible manner, always from the point of view of disease dissemination, and the records of work done by other investigators are particularly full and well digested. In fact, the text is a mine of information concerning the breeding, feeding habits, appearance and relation to disease of the individual families, genera and species. The work is evidently well done and bears the earmarks of accuracy. It also stands the test as regards completeness of data concerning the species treated.

The book is certainly popular—in the best sense of the word—rather than scientific, and is sure to prove very valuable to investigators experimenting on suspected species in the field. It is also an important reference work for those interested in this group either as students of Diptera, of medical zoology, or of disease transmission through insects.

HENRY B. WARD

Aposporie et Sexualité chez les Mousses, II.

Par EL. et EM. MARCHAL. Bull. de l'Acad. roy. de Belgique (Classe de sciences), No. 12, pp. 1249-1288. 1909.

In previous papers on mosses the Marchals have shown that the differentiation of sex in certain diœcious species takes place in the formation of spores in the sporangia, a single sporangium containing both male and female spores; further, that a regeneration obtained from the cells of the sporophyte of a diœcious species before the formation of spores will develop into an hermaphroditic growth and produce both archegonia and antheridia.

The present paper deals with the sexual character of the products of apospory or these sporophytic regenerations. As might be expected, the aposporic outgrowth induced from a mutilated young sporangium is found to agree with the sporophyte in the number of chromosomes in its cells, and with $2n$ chromo-

somes may therefore be classed as a diploid growth in distinction to the original gametophytic or haploid stage with its $1n$ number of chromosomes. These diploid growths of dioecious (heterothallic) species remain entirely sterile, though producing apparently normal antheridia and archegonia. Attempts made to produce hybridization between these hermaphroditic diploid growths and male and female plants of the normal $1n$ generation resulted in failure.

With hermaphroditic (homothallic) species the condition is different and the aposporic outgrowths are fertile. Their gametes with $2n$ chromosomes unite and produce sporophytes with $4n$ chromosomes. These tetraploid sporophytes form spores with again $2n$ chromosomes, which grow into fertile gametophytes with double the normal chromosome number, thus producing a definitely fixed bivalent race (*e. g.*, *Amblystegium serpens bivalens*). The regeneration from the tetraploid sporophyte gives rise to a race with $4n$ chromosomes which as yet has remained sterile. A sporophyte with $8n$ chromosomes might be produced if this $4n$ race could be induced to fruit.

No phenomena have been observed, such as apogamy or supplementary chromosome reduction, which would avoid the doubling of chromosomes in the races obtained from sporophytic regenerations.

A rather careful series of measurements were made of the size of the nuclei and cells in the different stages obtained, and it was found that the volume of the cells and of the nuclei were directly proportional to the number of chromosomes in the $1n$, $2n$ and $4n$ gametophytes as well as in the $2n$ and $4n$ sporophytes. Further, it was seen that this increase in size of the cells with an increase in the number of chromosomes resulted in the enlargement of certain organs such as the antheridia and archegonia.

The Marchals believe that apospory is likely to occur in nature from wounding of the sporophyte and that bivalent races have thus been formed.

There is promised a continuation of these investigations on the mosses which have

proved already of such great interest to the students of sex.

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A List of Geographical Atlases in the Library of Congress, with bibliographical notes. Compiled under the direction of PHILIP LEE PHILLIPS, F.R.G.S., Chief Division of Maps and Charts. In two volumes, cloth: Vol. I., Atlases, pp. xiv + 1,208, Vol. II., Author List, Index, pp. 1,209–1,659. Washington, Government Printing Office. 1909. \$2.35.

In the publication of these volumes a very commendable service has been done for geography and for students in all lines making use of maps. For it is strictly true as the editor says in his preface, "atlases have not received the consideration in bibliography due to their importance in literature and as contributions to knowledge." There are few works on the subject and these are fragmentary.

The present contribution is merely a list of the geographical atlases in the Library of Congress, a total of over thirty-four hundred titles in addition to seventy lettered titles. The editor modestly disclaims it as a bibliography.

The arrangement is good. It starts with general atlases of special subjects; the subject headings in alphabetical order. Then follow the general atlases in chronological order, and then follow America, Europe, Asia, Africa and Oceanica in similar order. This classification includes under each general heading the atlases of cities, of voyages of circumnavigation, historical works, scientific explorations, and the atlas material accompanying the reports on boundary disputes between nations.

Bibliographical notes and tables of contents have been given in case of the rare and more important volumes. This brings out numerous inserted maps, so frequently hidden away in such material.

In the second volume the general index is preceded by an author index of abridged titles, in which the author's full name is